tended as far south as the Texas Panhandle. Temperatures in Alabama ranged from 62° at Florence to 72° at Mobile. Shortly before 7 a. m. the towns of Ralph, Tuscaloosa County, and Pushmataha, were struck by tornadoes, and the northwestern counties of the State were recovering from the effects of the tornado that devastated portions of that section just after midnight. (See weather maps on p. 255.)

GENERAL SUMMARY OF THE FIVE TORNADOES.

At least five separate tornadoes are believed to have occurred in the State on the 16th, the first beginning at midnight and the last ending about 2.15 p. m. These tornadoes, together with the severe local thundersqualls and torrential rains that accompanied them and occurred elsewhere in the State, did enormous damage. Definite estimates are difficult to make, but it is known that not less than 13 persons were killed, more than 50 injured, and not less than $1,000,000 damage was done. Most of this damage was the result of the tornadoes, and was restricted to limited stretches in their paths, but the damage over wide areas to fences, trees, outbuildings, etc., by the thundersqualls, to roads, streets, plowed fields, etc., by the washing rains; and to culverts, bridges, crops, etc., by the freshets that followed is known to have been considerable. It is thought that complete information would materially add to the estimate of damage given.

Many interesting facts are brought out by the accompanying map (fig. 1) which shows the times of beginning and ending of rainfall and the location of the paths of the tornadoes. The tornadoes are seen to skirt the southeastern edge of the rain area in every case except the Gallion storm, which was the most local of the five. This strengthens the statements usually made that heavy rainfall does not precede tornadoes. A marked southeastward extension of the rain area is noted between 6 a. m. and 8 a. m., and 12 noon and 2 p. m.; during these four hours two of the tornadoes were in progress. There is a noticeable change in the direction of the tracks toward the east as the day advanced and the LOW moved northeastward. It is noted that tornado tracks, in recent years at least, seem to show a more easterly direction in southeastern Alabama than in the northwestern part of the State.

A chart of all available wind directions reported by cooperative observers (fig. 2) shows that no important variations in wind direction obtained at 7 a. m., the winds being generally south or southeast. At Montgomery there was no permanent shift of the wind to the northwest until the morning of the 17th, although there was the usual temporary shift accompanying the thundersquall. *Stratus clouds* at Montgomery were from the southwest throughout the 16th, and it would seem likely that there was an overflow of the wind-shift line of the LOW to the southeastward at a moderate elevation. It is not believed that the wind-shift line at the surface reached Alabama.

The distribution of rainfall over Alabama is shown by figure 3. An attempt has been made to adjust the data to a midnight-to-midnight total, the time of beginning and ending of precipitation being utilized to accomplish this as far as possible. Six areas of 4 inches or more of precipitation are shown. In most cases these lie to the southeast of one of the tracks of the tornadoes. The last tornado traversed a section where less than 2 inches of rain fell, although rainfall in the immediate track of this storm was reported very heavy, being estimated at between 3 and 4 inches in the section northwest of Wetumpka.

An interesting feature connected with the tracks of the first and last of the tornadoes is that they follow the same general tracks as the Marion County tornado of April 20, 1920, and the Deatsville-Agricola and West Point tornado of March 28, 1920. (See fig. 4.)

TORNADOES IN TENNESSEE ON APRIL 16, 1921.

By R. M. WILLIAMSON, Meteorologist.

[U. S. Weather Bureau, Nashville, Tenn., May 27, 1921.]

A depression over the central Mississippi Valley was attended by heavy rainfall with much thunder and lightning and severe local storms in Tennessee during the night of the 15–16th. (See weather maps, figs. 1 and 2, p. 255.) The greatest damage resulted in the south-central counties, where several tornadoes occurred about 4 a. m.

One was first observed 5 miles southwest of Lynnville, Giles County, from which place it moved northeastward to Gileston, 1 mile south of Lynnville, and thence into Marshall County, spending its force, apparently, near Mooresville, a few miles northeast of Lynnville. At Gileston 36 empty freight cars were more or less wrecked, entailing a loss of about $10,000. Just east of Lynnville several dwellings and many outhouses were blown down, a child was killed, and a number of persons were injured. Along other parts of its course of 12 miles or more there was much damage to houses, trees, fences, etc. The total damage from this storm was about $35,000.

Another tornado passed through Cornersville, in the southern part of Marshall County, about 4 a. m., destroying much property and injuring twelve or fifteen persons, one of whom died several days later. The loss in this vicinity was said to be about $30,000. The storm next appeared near Palmetto, Bedford County, where barns, trees, and fences were blown down but no serious damage occurred. There were sections along its course several miles in length where the storm evidently lifted, as the destruction was slight. It is very probable that this storm continued northeastward into Rutherford County, becoming active again in the vicinity of Dennis and Readyville, where many houses were partially wrecked about 5 a. m. If this be true, the distance covered during the hour was about 45 or 50 miles. The total loss was probably not less than $50,000.

The observer at Coldwater, in the southwestern part of Lincoln County, reports considerable property destroyed and several persons seriously injured in a tornado that passed 2 miles north of that station.

About 9 a. m. of the same date, the town of Newport, Cocke County, in the eastern part of the State, was struck by a tornado, moving from west to east and cutting a path 50 feet wide along Main Street. Damage to shade trees, houses, automobiles, wires, etc., amounted to five or six thousand dollars. The comparatively small damage was due to the fact that the storm's path was narrow and, apparently, did not reach the residences and other buildings. Few persons were out of doors, due to a heavy rain falling, and only three were injured. After traversing four city blocks the storm lifted and struck again in the timber east of the town.

Tornadoes occur much less frequently in east Tennessee than in the western half of the State. It is interesting to note in this connection that two previous storms of this character occurred in the vicinity of Newport, according

Chart I. Location of tracks of tornados in Alabama, April 16, 1921.

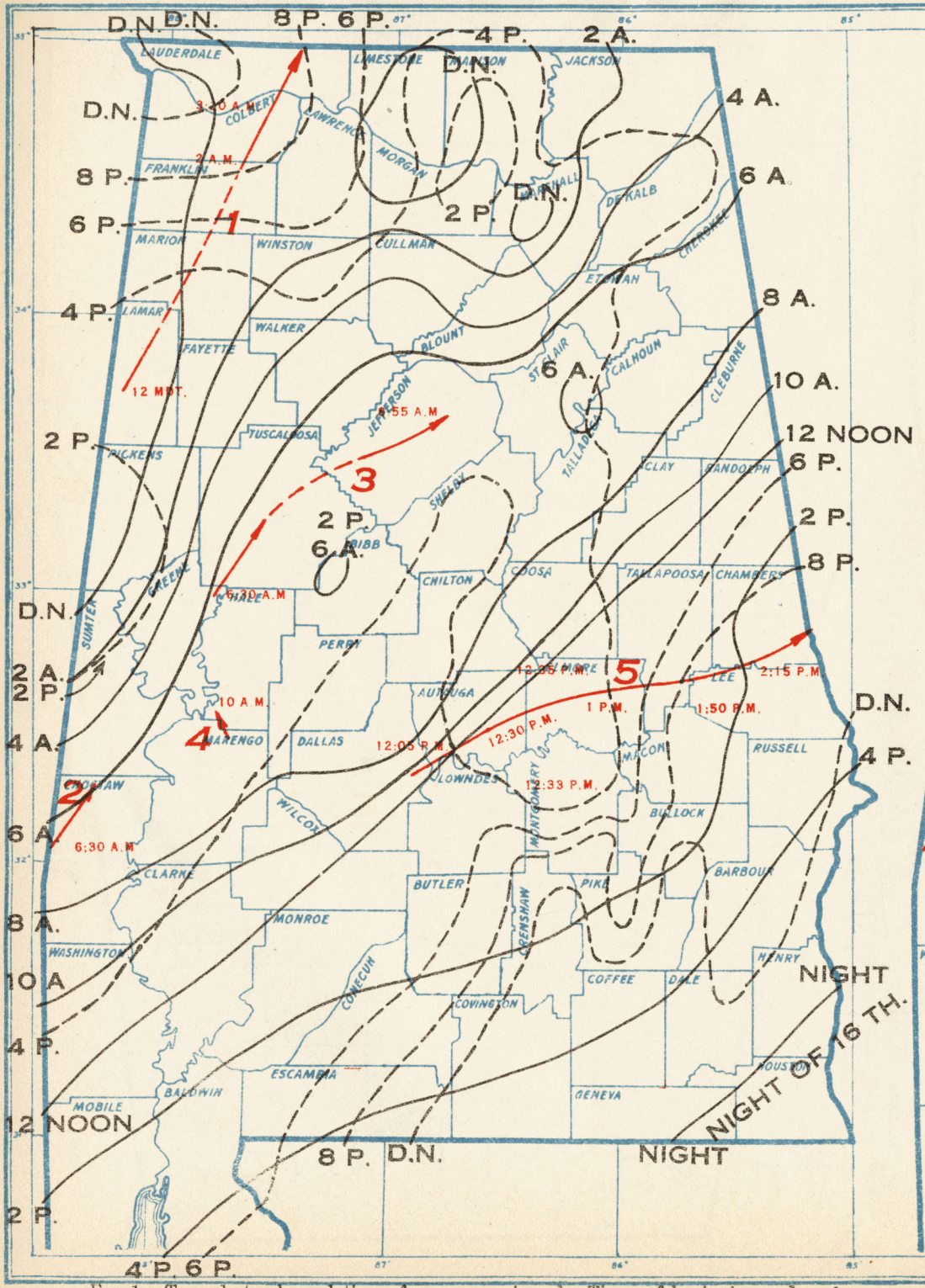

Fig. 1.—Tornado tracks and time of occurrence in red. Times of beginning and ending of rain in black; solid for beginning, dashed for ending. The tracks are numbered in red in the order of their occurrence.

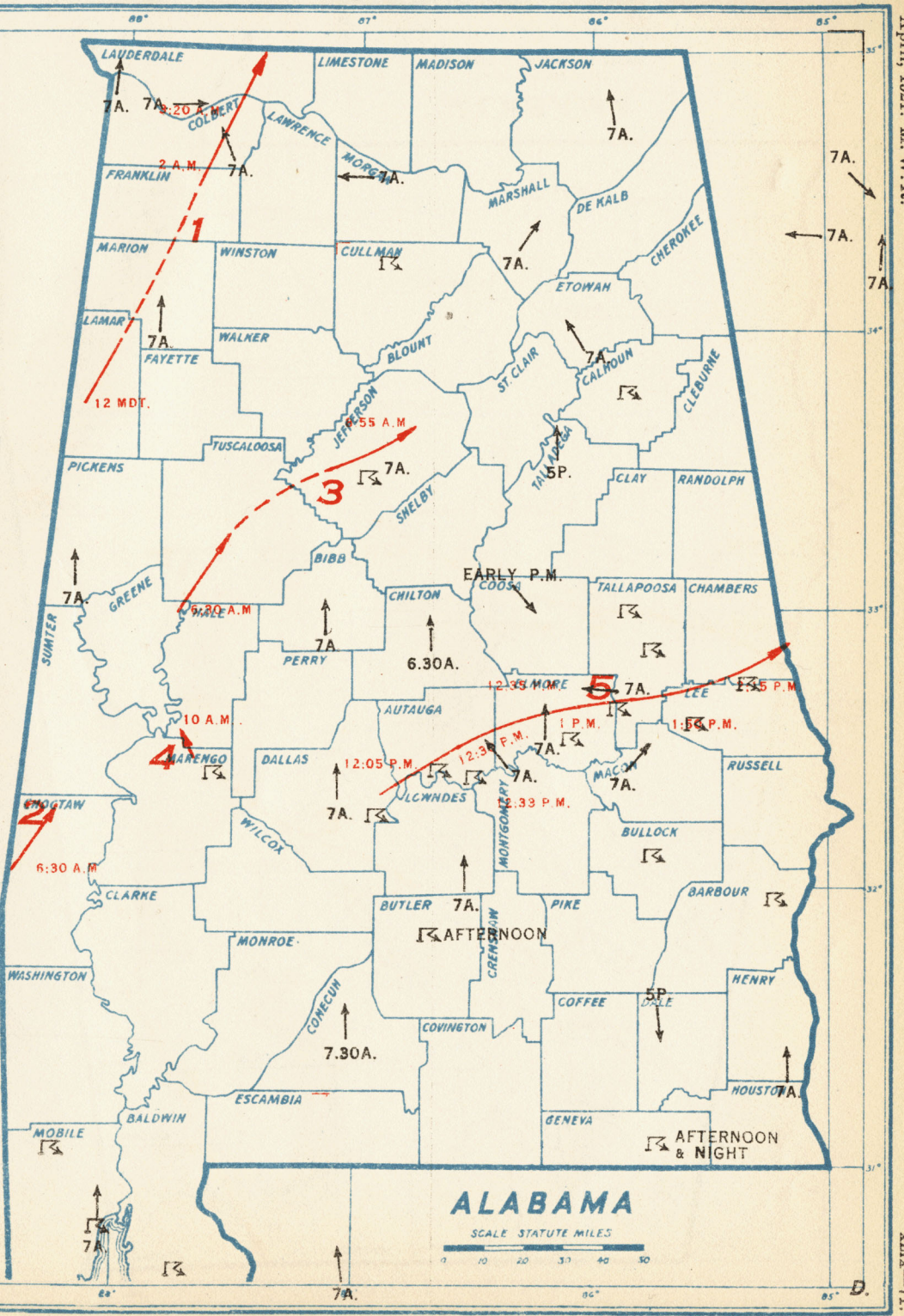

Fig. 2.—Tornado tracks and time of occurrence in red. Thunderstorms reported, wind direction, and time in black.

P. H. S. & J. W. S. **Chart II. Location of tracks of tornados in Alabama, April 16, 1921.**

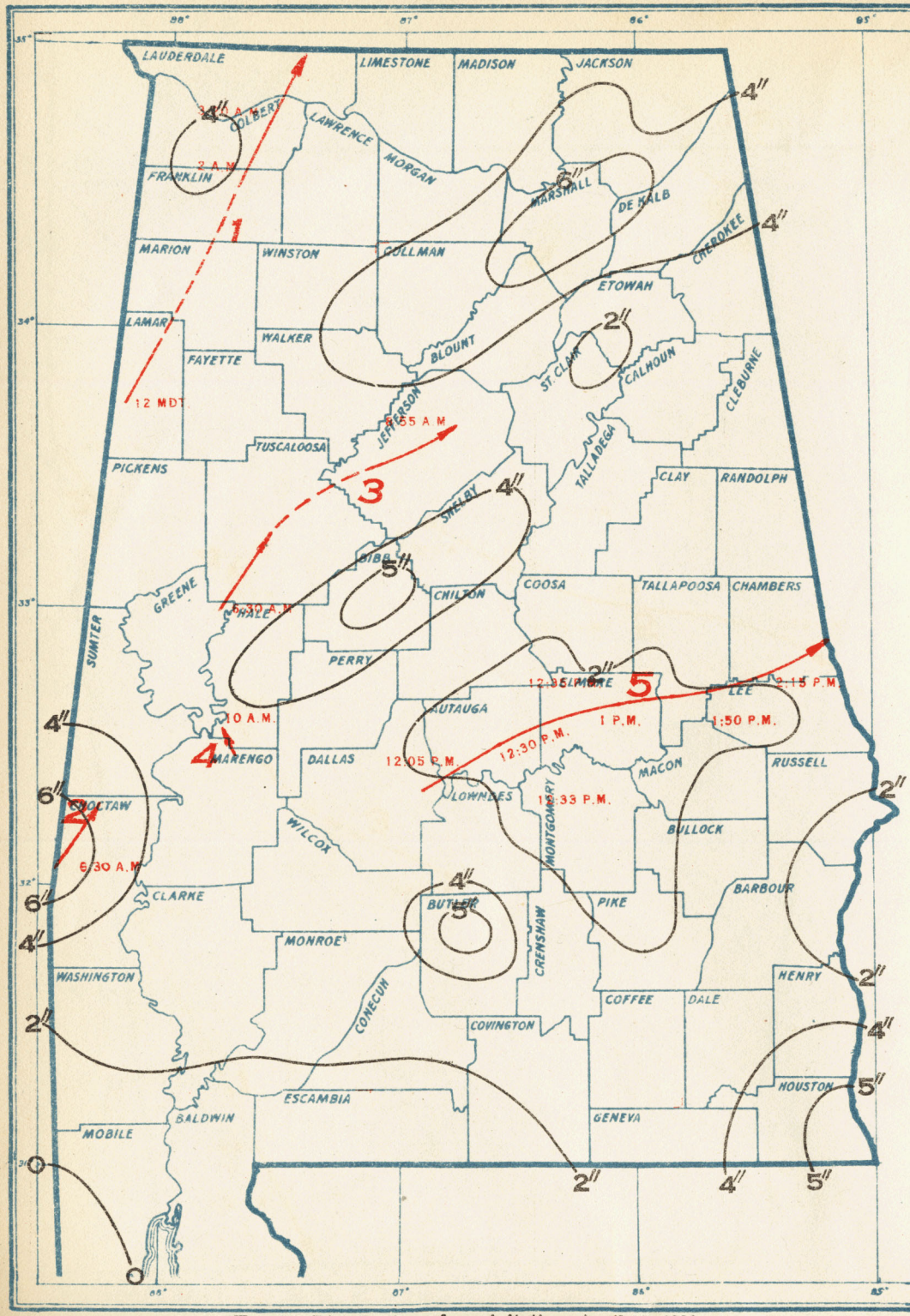

Fig. 3.—Distribution of precipitation, April 16, 1921.

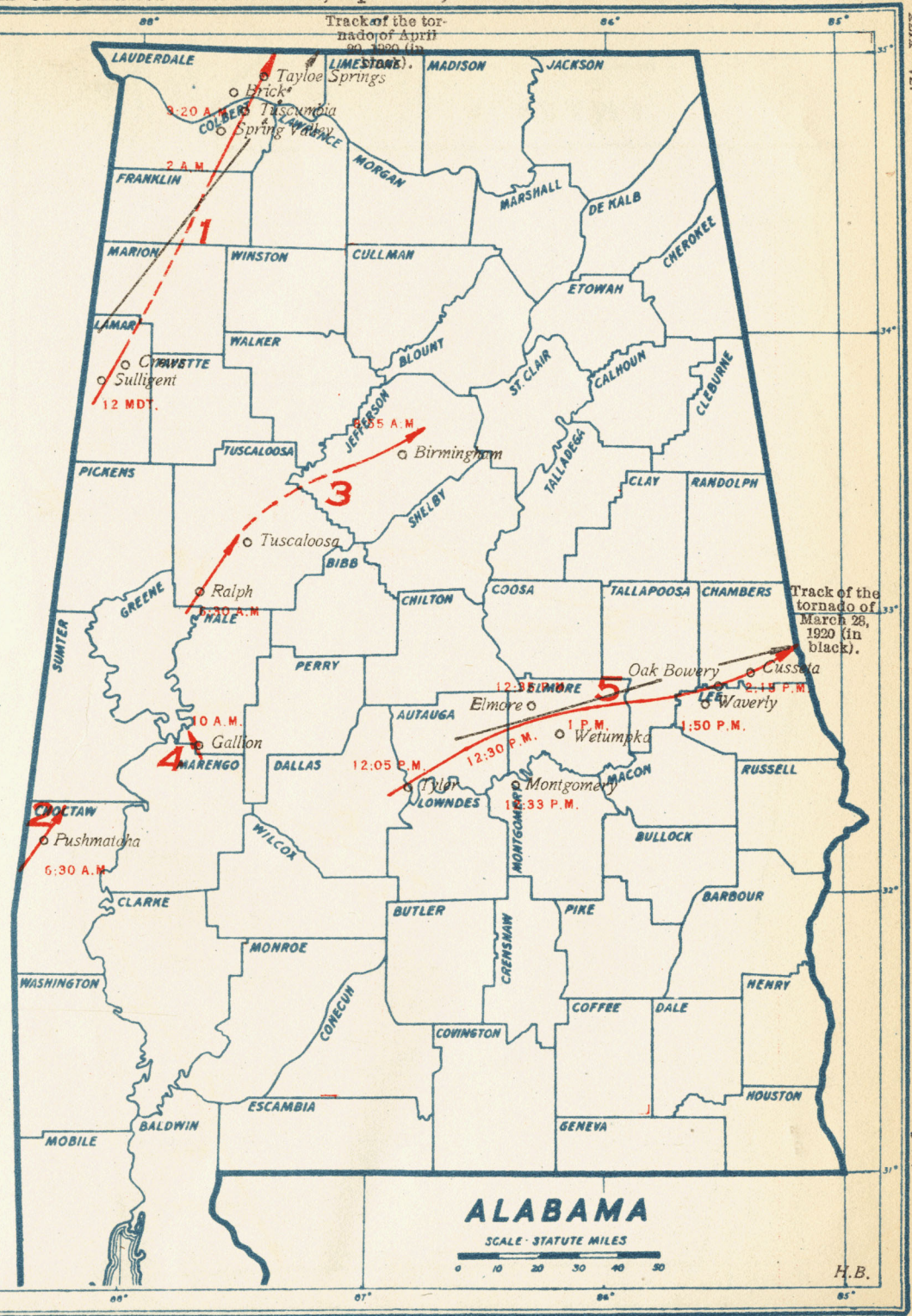

Fig. 4.